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CENTRAL FAX CENTER

JUN 19 2008

Application No.: 10/065,762

Docket No.: JCLA8424

AMENDMENTIn The Specification:

The section entitled "SUMMARY OF THE INVENTION" is amended as follows:

[0003] Therefore, the present invention provides a buffer device ~~message transmitting queue~~ and the method for operating the same, applied to a multi-threaded system to prevent the misplacement or the overlap of data and command in the transmitted message without using the software semaphore. In some embodiments, the buffer device may be a message transmitting queue.

[0004] The present invention provides a buffer device ~~message transmitting queue~~ to provide an access media for transmitting messages between the source controller and the destination controller, comprising a plurality of message rows, a write control unit and a read control unit. The plurality of message rows is used to store the message that the source controller intends to transmit to the destination controller. Moreover, each message row at least comprises a write complete flag and a distribution complete flag. The write control unit is coupled to the source controller and the plurality of message rows, wherein when the source controller intends to write the message, the write control unit sequentially outputs the address of the free message row according to the distribution complete flag. When the source controller completes reading the address of the message row, the write control unit sets the distribution complete flag of the message row. When the source controller completes writing the message of the message row, the write control unit sets the write complete flag of the message row, and when the buffer device

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~~message transmitting queue~~ does not have a free message row, outputs a no free message row signal. The read control unit is coupled to the destination controller and the plurality of message rows. When the write complete flag of the message row that is sequentially read is set, the read control unit issues a read request to inform the destination controller to read the message of the message row, and when the destination controller completes reading the message, clears the distribution complete flag and the write complete flag of the message row.

[0005] In the preferred embodiment of the present invention, the write control unit comprises a write pointer control unit, a distribution complete flag multiplexer, and a distribution address multiplexer. The write pointer control unit is used to store a write address of the message row of the buffer device ~~message transmitting queue~~. When the source controller completes reading the write address, the write pointer control unit sets the distribution complete flag of the message row pointed to by the write address and progresses the write address, and when the source controller completes writing the message of the message row, the write pointer control unit sets the write complete flag of the message row. The distribution complete flag multiplexer, that is coupled to the write pointer control unit and the plurality of distribution complete flags of the plurality of message rows, is used to output a not-distributed signal according to the distribution complete flag of the message row pointed to by the write address. The distribution address multiplexer, that is coupled to the distribution complete flag multiplexer and the write pointer control unit, is used to determine and output either the write address or the no free message row signal according to the not-distributed signal.

[0006] Furthermore, the read control unit comprises a read pointer control unit, a read

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buffer, and a read request multiplexer. The read pointer control unit is used to store a read address of the buffer device message transmitting queue, wherein when the destination controller completes reading the message of the message row pointed to by the read address, the read pointer control unit clears the distribution complete flag and the write complete flag of the message row and progresses the read address. The read buffer that is coupled to the read pointer control unit and the plurality of message rows is used to output the message of the message row pointed to by the read address. The read request multiplexer, that is coupled to the read pointer control unit and the plurality of write complete flags of the plurality of message rows, is used to output the read request according to the write complete flag of the message row pointed to by the read address.

[0007] In the preferred embodiment of the present invention, the size of the message that the source controller intends to transmit to the destination controller is two times of the atomic data read/write size of the source controller. For example, each message comprises data and command, and the size of data and command is the atomic data read/write size of the source controller. It is preferred that the size of the data row and the command row is a multiple of four bytes.

[0008] The present invention further provides an operating method of the buffer device message transmitting queue for transmitting the message of the source controller to the destination controller. The buffer device message transmitting queue comprises a plurality of message rows, a write pointer and a read pointer. Moreover, each message row at least comprises a write complete flag and a distribution complete flag. The method comprises the steps of: at first, setting the write pointer and the read pointer to point to the first message row address; when the source controller completes reading the write pointer, setting the distribution complete flag of the message row

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pointed to by the write pointer and progressing to the write pointer; when the source controller completes writing the message of the message row, setting the write complete flag of the message row; when the write complete flag of the message row pointed to by the read pointer is set, issuing a read request; and when the destination controller completes reading the message of the message row pointed to by the read pointer, clearing the distribution complete flag and the write complete flag of the message row pointed to by the read pointer and progressing the read pointer.

[0009] In the preferred embodiment of the present invention, when the write pointer progresses and points to a message row whose distribution complete flag is set, a no free message row signal is issued to inform the source controller. Wherein, the read request is the interrupt request of the central processing unit.

[0010] As shown in the description above, the message transmitting system that applies the buffer device ~~message-transmitting-queue~~ of the present invention allows the source controller individually to write the message such as data and command according to the message row address distributed by the buffer device ~~message-transmitting-queue~~. Moreover, the destination controller reads the message sequentially according to the write complete flag and the read address. The system operated according to this mechanism prevents the message misplacement and overlap that may happen in the traditional queue, and does not have to use the complicated semaphore that incurs a software burden. Therefore, the system performance is improved significantly.

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The paragraph [0021] is amended as follows:

[0021] A message transmitting queue is used to transmit a plurality of messages from the source controller to the destination controller, comprising a plurality of message rows, a write pointer and a read pointer. Moreover, each message row at least comprises a write complete flag and a distribution complete flag. The operating method is shown in FIG. 2, comprising the steps of: in step S210, when the system is reset, setting the write pointer and the read pointer to point to the first message row address; in step S220, when the source controller completes reading the write pointer, setting the distribution complete flag of the message row pointed to by the write pointer and progressing the write pointer; in step S230, when the source controller completes writing the message into the message row, setting the write complete flag of the message row; in step S240, when the write complete flag of the message row pointed to by the read pointer is set, issuing a read request; and in step S250, when the destination controller completes reading the message from the message row pointed to by the read pointer, clearing the distribution complete flag and the write complete flag of the message row pointed to the read pointer and progressing the read pointer. When the write pointer progresses and points to a message row whose distribution complete flag is set, a no free message row signal is output to inform the source controller that there is no free message row to be used anymore.